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EXAMINER

AGUSTIN, PETER VINCENT

ART UNIT	PAPER NUMBER
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2652

DATE MAILED: 08/11/2004

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/988,788

Applicant(s)

SHIONO ET AL.

Examiner

Peter Vincent Agustin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Drawings

1. The drawings were received on July 7, 2004. These drawings are acceptable.

Claim Objections

2. Claims 1-31 are objected to because of the following informalities:

Claims 1 & 17, lines 6-7: "an information recording medium" should be --the information recording medium--.

Claim 17, line 11: "amount" should be --an amount--.

Claims 2-16 & 18-31 are dependent upon objected base claims.

Appropriate correction is required.

3. Claims 11 & 24 are objected to. On line 2, the applicant appears to convey that the information recording medium comprises **only** the recording member, i.e., without the substrate of claims 12 and 25 or the protecting member of claims 13 & 26. Therefore, "only a single recording member" should be --only the recording member--. Alternatively, applicant could rephrase the limitation as --wherein said recording member is a single member--.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 11 & 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wierenga (US 6,552,985) in view of the applicant's admitted prior art (hereafter Admission).

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In regard to claim 1, Wierenga discloses an optical information recording and reproducing apparatus (figure 4) for recording information bits into an information recording medium (1) having a recording member (figure 1, elements 41-43) into which information bits are recorded in a three-dimensional arrangement by changing an optical constant (column 4, lines 39 & 55, i.e., "transmission coefficient" or "transmission properties") of the recording member of the recording medium, the apparatus comprising: a light source (figure 1, element 3) that emits a light beam (2); an objective lens (inherent: see note below) that converges the light beam emitted from the light source to an information recording medium; and a light detector (inherent: see note below) that detects the light beam from the information recording medium, and the information bits are sequentially recorded into the recording member in a three-dimensional arrangement such that a converging light beam from the objective lens does not pass through information bits that have already been recorded (column 3, lines 13-32). It should be noted that the claimed objective lens and light detector are inherent since focused light and detected light are disclosed (see column 4, line 11 & figure 4, element 55). However, Wierenga is silent to whether a thickness of the recording member is larger than a wavelength of the light beam.

Admission discloses an optical recording medium (see page 1, lines 21-22 of the applicant's disclosure) wherein a thickness of the recording member is larger than a wavelength of the light beam. It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have used the recording member having a thickness larger than the wavelength as suggested by Admission for the apparatus of Wierenga, the motivation being to increase information recording capacity (see page 2, lines 8-9).

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Furthermore, in regard to claim 2, Wierenga discloses that the information bits are sequentially recorded from the farthest points from the objective lens in the recording member (see column 3, lines 13-32).

Furthermore, in regard to claim 11, Wierenga discloses that the information recording medium comprises only the recording member (figure 1, element 42) (see also the objection above).

Furthermore, in regard to claim 30, Wierenga discloses that the recording member is a single recording layer (figure 1, element 42) (see also the objection above).

6. Claims 9 & 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wierenga & Admission as applied to claim 1 above, and further in view of Ito et al. (hereafter Ito) (US 5,734,632).

For a description of Wierenga & Admission, see the rejection above. Wierenga & Admission, however, do not disclose that the optical constant is a refractive index, and that an amount of the change in refractive index is more than or equal to 0.005.

Ito discloses recording/reproducing information by changing the refractive index, wherein the amount of change is 0.005 or more (column 9, lines 6-22). At the time the invention was made, it was well-known to use either transmission or refractive change for their purpose in recording information and selection of either one would have been obvious to one of ordinary skill in the art. One of ordinary skill in the art, furthermore, would have recognized that use of either the change in transmission coefficient taught by Wierenga & Admission or the change in refractive index taught by Ito would have been obvious equivalent alternative types of recording

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techniques, because both teachings perform the same function of recording information to a recording medium.

7. Claims 17, 24 & 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wierenga in view of Admission & Ito.

In regard to claim 17, Wierenga discloses an optical information recording and reproducing apparatus (figure 4) for recording information bits into an information recording medium (1) having a recording member (figure 1, elements 41-43) into which information bits are recorded in a three-dimensional arrangement, the apparatus comprising: a light source (3) that emits a light beam (2); an objective lens (inherent: see claim 1 rejection above) that converges the light beam emitted from the light source to an information recording medium; and a light detector (inherent: see claim 1 rejection above) that detects a light beam from the information recording medium, wherein the information bits are recorded sequentially into the recording member in a three-dimensional arrangement such that the number of rows of information bits which have been already recorded in the direction of optical axis is not more than 4 (column 3, lines 13-32 and figure 1). However, Wierenga is silent to whether a thickness of the recording member is larger than a wavelength of the light beam. Wierenga also does not disclose that information bits are recorded by changing a refractive index of the recording member of the recording medium wherein amount of the change in refractive index is less than or equal to 0.02.

Admission discloses an optical recording medium (page 1, lines 21-22) wherein a thickness of the recording member is larger than a wavelength of the light beam. It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have

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used the recording member having a thickness larger than the wavelength as suggested by Admission for the apparatus of Wierenga, the motivation being to increase information recording capacity (see page 2, lines 8-9).

Ito discloses recording/reproducing information by changing the refractive index, wherein the amount of change is less than or equal to 0.02 (column 9, lines 6-22). At the time the invention was made, it was well-known to use either transmission or refractive change for their purpose in recording information and selection of either one would have been obvious to one of ordinary skill in the art (see for example Yamamoto et al. (JP 56156941 A), last two lines of purpose). One of ordinary skill in the art, furthermore, would have recognized that use of either the change in transmission coefficient taught by Wierenga or the change in refractive index taught by Ito would have been obvious equivalent alternative types of recording techniques because both teachings perform the same function of recording information to a recording medium. Furthermore, for the purpose of recording, the use of either a change in transmission coefficient or a change in refractive index would have been an obvious matter of design choice.

Furthermore, in regard to claim 24, Wierenga discloses that the information recording medium comprises only the recording member (figure 1, element 42) (see also the objection above).

Furthermore, in regard to claim 31, Wierenga discloses that the recording member is a single recording layer (figure 1, element 42) (see also the objection above).

8. Claims 3 & 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wierenga & Admission as applied to claim 1 above and over Wierenga, Admission & Ito as applied to claim 17 above, and further in view of Kasono (US 6,292,442).

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For a description of Wierenga, Admission & Ito, see the rejections above. However, it is not disclosed that the objective lens comprises a lens of which numerical aperture is more than or equal to 0.7, and pinholes are disposed in an optical path including the objective lens and the light detector such that the light beam from the information recording medium is detected by the light detector after passing through the pinholes.

Kasono discloses pinholes (figure 5, element 213) disposed in an optical path including an objective lens (205) and a light detector (211) such that the light beam from an information recording medium (1) is detected by the light detector after passing through the pinholes, the pinholes being provided so that light can be gathered accurately and to remove aberration, as known in the art (see also Takahashi (US 6,072,763) (title)). Furthermore, Kasono discloses that an object lens with a large numerical aperture is used (column 1, lines 7-9), i.e., one that would be greater than 0.7, in order to increase recording density. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use an object lens having a large numerical aperture, i.e., 0.7 or more, in the primary references as taught by Kasono, in order to provide increased recording density. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have added the pinholes of Kasono along the optical path of the objective lens and the light detector of Wierenga, Admission & Ito, the motivation being to accurately gather light and remove aberration, thereby enabling recording accuracy.

9. Claims 4, 5, 6, 16, 19, 20, 21 & 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wierenga & Admission as applied to claim 1 above and over Wierenga,

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Admission & Ito as applied to claim 17 above, and further in view of Hino et al. (hereafter Hino) (US 6,178,151).

For a description of Wierenga, Admission & Ito, see the rejections above. However, in regard to claims 4 & 19, neither one of the references discloses a focus/track error signal detecting optical element which is an optical splitting element and disposed in an optical path including the objective lens and the light detector, and a pinhole array having a plurality of pin holes and disposed in the optical path, wherein the light beam from the information recording medium is split into a plurality of light beams by means of the focus/track error signal detecting optical element, and the plurality of light beams are detected by the light detector after passing through corresponding pinholes of the pinhole array.

Hino discloses a focus/track error signal detecting optical element (figure 1, element 106) which is an optical splitting element and disposed in an optical path including an objective lens (105) and a light detector (109), and a pinhole array (108) having a plurality of pin holes and disposed in the optical path, wherein a light beam from an information recording medium (112) is split into a plurality of light beams by means of the focus/track error signal detecting optical element, and the plurality of light beams are detected by the light detector after passing through corresponding pinholes of the pinhole array. It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have added the focus/track error signal detecting optical element of Hino to the apparatus of Wierenga, Admission & Ito, the motivation being to compensate for offsets caused by focusing/tracking errors, thereby maintaining recording accuracy; and to have added the pinhole array of Hino to the apparatus of Wierenga,

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Admission & Ito, the motivation being to accurately gather light and remove aberration, thereby enabling recording accuracy. (See also claims 3 & 18 rejections above).

In regard to claims 5 & 20, neither one of the references discloses a focus/track error signal detecting optical element disposed in an optical path including the objective lens and the light detector, wherein the light beam from the information recording medium is split into a plurality of light beams by means of the focus/track error signal detecting optical element, and each split light beam is detected by the light detector having an area smaller than that of each of the split light beams.

Hino discloses a focus/track error signal detecting optical element (figure 1, element 106) disposed in an optical path including an objective lens (105) and a light detector (109), wherein a light beam from an information recording medium (112) is split into a plurality of light beams by means of the focus/track error signal detecting optical element, and each split light beam is detected by the light detector having an area smaller than that of the split light beam (note how the beam from element 106 converges into a smaller area of element 109). It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have added the focus/track error signal detecting optical element of Hino to the apparatus of Wierenga, Admission & Ito, the motivation being to compensate for offsets caused by focusing/tracking errors, thereby maintaining recording accuracy.

In regard to claims 6 & 21, neither one of the references discloses a focus/track error signal detecting optical element disposed in an optical path including the objective lens and the light detector, and a pinhole array having a plurality of pinholes and disposed on the optical path, wherein the light beam from the information recording medium is split into a plurality of light

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beams by means of the focus/track error signal detecting optical element, and the light beams corresponding to track error signals are detected by the light detector after passing through pinholes of the pinhole array.

Hino discloses a focus/track error signal detecting optical element (figure 1, element 106) disposed in an optical path including an objective lens (105) and a light detector (109), and a pinhole array (108) having a plurality of pinholes and disposed on the optical path, wherein a light beam from an information recording medium (112) is split into a plurality of light beams by means of the focus/track error signal detecting optical element, and the light beams corresponding to track error signals are detected by the light detector after passing through pinholes of the pinhole array. It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have added the focus/track error signal detecting optical element of Hino to the apparatus of Wierenga, Admission & Ito, the motivation being to compensate for offsets caused by focusing/tracking errors, thereby maintaining recording accuracy; and to have added the pinhole array of Hino to the apparatus of Wierenga, Admission & Ito, the motivation being to accurately gather light and remove aberration, thereby enabling recording accuracy. (See also claims 3 & 18 rejections above).

In regard to claims 16 & 29, it is not disclosed that a focus position of the objective lens is controlled with reference to an interface of the recording member of the recording medium.

Hino discloses in column 7, lines 38-42 that a focus position of the objective lens is controlled with reference to an interface of the recording member of the recording medium. It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have controlled a focus position as suggested by Hino with reference to an interface

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of the recording member of Wierenga, Admission & Ito, the motivation being to maintain optimum recording accuracy.

10. Claims 7 & 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wierenga & Admission as applied to claim 1 above and over Wierenga, Admission & Ito as applied to claim 17 above, and further in view of Suh (US 4,793,696).

For a description of Wierenga, Admission & Ito, see the rejections above. Furthermore, Wierenga discloses in column 4, lines 9-19 that the wavelength λ of the light beam emitted from the light source is in a range satisfying $0.35 \mu\text{m} \leq \lambda \leq 0.45 \mu\text{m}$. It should be noted that a wavelength of $0.35 \mu\text{m}$ (or 350 nm) is in the ultraviolet range and a wavelength of $0.45 \mu\text{m}$ (or 450 nm) is in the visible part of the light spectrum, as known in the art. However, it is not disclosed that the optical system including the objective lens is configured to be achromatic.

Suh discloses an optical system configured to be achromatic so that the optical system is able to use different lasers, i.e., lasers of different wavelengths (column 5, lines 16-25). It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have configured the optical system of Wierenga, Admission & Ito to be achromatic, as suggested by Suh, the motivation being to enable the optical system to use lasers of different wavelengths, thereby making the system compatible with a wider range of optical devices.

11. Claims 8 & 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wierenga & Admission as applied to claim 1 above and over Wierenga, Admission & Ito as applied to claim 17 above, and further in view of McLeod et al. (hereafter McLeod) (US 6,020,985).

For a description of Wierenga, Admission & Ito, see the rejections above. However, neither one of the references discloses a spherical aberration correcting element disposed in an

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optical path including the light source and the objective lens, wherein the spherical aberration correcting element controls an amount of spherical aberration in accordance with a recording depth of the information bits to be recorded into the recording member.

McLeod discloses in figure 1B a spherical aberration correcting element (39a) disposed in an optical path including a light source (34) and an objective lens (48a), wherein the spherical aberration correcting element controls an amount of spherical aberration in accordance with a recording depth of information bits (see column 5, lines 43-60) to be recorded into a recording member (figure 2B, element 66). It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have added the spherical aberration correcting element of McLeod to the apparatus of Wierenga, Admission & Ito, the motivation being to compensate for spherical aberration, thereby minimizing recording/reading errors.

12. Claims 12, 13, 25 & 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wierenga & Admission as applied to claim 1 above and over Wierenga, Admission & Ito as applied to claim 17 above, and further in view of Kikukawa et al. (hereafter Kikukawa) (US 6,169,722).

For a description of Wierenga, Admission & Ito, see the rejections above. However, in regard to claims 12 & 25, the references remain silent to whether the information recording medium comprises a recording member and a substrate. In regard to claims 13 & 26, the references remain silent to whether the information recording medium is configured by a recording member sandwiched between a substrate and a protecting member.

In regard to claims 12 & 25, Kikukawa discloses in figures 5 & 6 a recording medium comprising a recording member (4) and a substrate (2). In regard to claims 13 & 26, Kikukawa

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discloses in figures 5 & 6 a recording medium configured by a recording member (4) sandwiched between a substrate (2) and a protecting member (6). It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have added the substrate and protecting member of Kikukawa to the information recording medium of Wierenga, Admission & Ito, in order to make the disc and keep it undamaged.

13. Claims 14 & 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wierenga & Admission as applied to claim 1 above and over Wierenga, Admission & Ito as applied to claim 17 above, and further in view of Durham (US 5,532,998).

For a description of Wierenga, Admission & Ito, see the rejections above. However, it is not disclosed that the light detector comprises an avalanche photodiode.

Durham discloses a light detector comprising an avalanche photodiode that provides greater sensitivity (column 14, lines 9-12). It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have provided an avalanche photodiode to the light detector of Wierenga, Admission & Ito as suggested by Durham, the motivation being to provide greater sensitivity.

14. Claims 15 & 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wierenga & Admission as applied to claim 1 above and over Wierenga, Admission & Ito as applied to claim 17 above, and further in view of Ishii et al. (hereafter Ishii) (US 4,125,860).

For a description of Wierenga, Admission & Ito, see the rejections above. However, neither one of the references discloses a condenser lens disposed on one side of the information recording medium opposite to the objective lens, the condenser lens converging the light beam from the information recording medium to the light detector to detect the light beam.

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Ishii discloses in figure 5 a condenser lens (33) disposed on one side of an information recording medium (20) opposite to an objective lens (32), the condenser lens converging a light beam from the information recording medium to a light detector (34 & 35) to detect the light beam. It would have been obvious to one of ordinary skill in the art at the time of invention by the applicant to have added the condenser lens of Ishii to the apparatus of Wierenga, Admission & Ito, the motivation being to reduce the size and cost of the apparatus while maintaining reproduction with high efficiency.

Response to Arguments

15. Applicant's arguments with respect to the rejection of claim 1 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made over Wierenga in view of the applicant's admitted prior art.

16. Applicant's arguments regarding claim 11 have been fully considered but they are not persuasive.

As noted in the objection above, the applicant appears to convey that the information recording medium comprises **only** the recording member, i.e., without the substrate of claims 12 and 25 or the protecting member of claims 13 & 26. Furthermore, the use of the word "comprises" allows more than one recording member in the recording medium.

17. Applicant's arguments regarding claim 17 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the

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teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves **or in the knowledge generally available to one of ordinary skill in the art**. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation for the rejection is found in the knowledge generally available to one of ordinary skill in the art, as explained in the previous Office Action. Furthermore, the examiner would like to add that the use of either a change in transmission coefficient or a change in refractive index for the purpose of recording would have been an obvious matter of design choice. An excerpt of Japanese Patent, Yamamoto et al. (JP 56156941 A) has been provided as evidence (see last two lines of purpose).

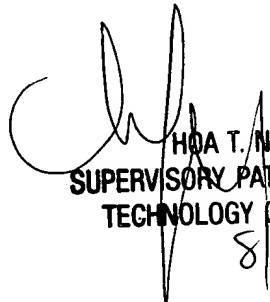
18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter Vincent Agustin whose telephone number is 703-305-8980. The examiner can normally be reached on Monday-Friday 9:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Thi Nguyen can be reached on 703-305-9687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Peter Vincent Agustin
Art Unit 2652
July 29, 2004


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8/5/04